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COLUMBIA BASIN SALMON & STEELHEAD IDENTIFICATION & MODELING

by

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ABSTRACT

The Idaho Department of Fish and Game tagged 930,544 fish for release during the fall of 1979 and the spring of 1980. Included in this total were 375,325 spring chinook salmon, 119,426 fall chinook salmon and 435,793 summer steelhead. No summer chinook were tagged for contribution purposes.

Problems of fish disease and tagging mortality were very minimal throughout the year as a result of excellent fish health at all hatcheries.

Juvenile outmigration for the spring of 1980 appears to be the best in recent years. This coupled with a large transport operation conducted by the National Marine Fisheries Service should result in an increase of adult returns and consequently tag recovery information.

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RECOMMENDATIONS

The coded wire tagging program should be continued at the present, or a higher, tagging level until the following can be assessed:

1. Idaho's contribution to the various lower Columbia River and ocean fisheries.

2. The effectiveness and contribution of the new mitigation hatcheries such as the McCall facility.

3. Solutions to present problems of rearing, release and transportation.

The program should continue for a minimum of 4 years after the last tag re-lease in order to retrieve and publish the outstanding tag data.

OBJECTIVES

The objectives of the coded wire tagging operation in Idaho are two-fold. First, and most important, is the identification of Idaho reared salmon and steelhead in the various fisheries outside of the State of Idaho. The second is to enhance the knowledge of steelhead and salmon through meaningful and well designed research studies.

Presently, Idaho is involved in an extensive tagging operation. This program is being utilized in studies to:

1. Assess the contribution Idaho fish are making to the various fisheries including sport, commercial and Indian.

2. Assess fish passage conditions and losses at each of eight dams between Idaho and the ocean.

3. Evaluate various hatchery rearing and handling procedures including diet, conditioning, size at release and release location.

4. Learn more concerning migrational, homing and behavioral characteristics of Idaho steelhead and salmon.

5. Help propagate and thus, perpetuate, threatened races of fish and to maintain wild populations.

6. Determine the timing of various stocks into the Columbia River system.

7. Predict future run size.

INTRODUCTION

During the early stages of Idaho's coded wire tagging program, the following guidelines and goals were established to carry out the objectives of the program:

1. Mark salmon and steelhead smolts with a coded wire tag in order to provide information that is vitally needed for the management and perpetuation of

these species in Idaho.

2. Design functional experiments on all fish tagged which will result in needed information on the various aspects of contribution, rearing, releasing and tagging.

3. Search for better techniques and modifications which will improve the quality and efficiency of tagging operations.

4. Tag approximately 1,000,000 salmon and steelhead smolts for release each year. Total numbers should be increased as new hatcheries are built and the contribution of Idaho reared fish to the ocean fishery increases.

5. Schedule tagging as early in the tagging season as possible to prevent excessive handling at smolting time.

6. Monitor downstream and ocean recoveries in close coordination with other agencies and make checks where needed.

7. Plan and coordinate efforts for tag recovery to insure that as many tags as possible are recovered. Recovery efforts should be emphasized at hatcheries and on spawning ground surveys.

8. Establish a tag recovery center to receive and analyze recovered tags.

During the past 4 years the program has followed these guidelines and established the necessary procedures and facilities to carry out the objectives of the program. This report covers coded-wire tagging operations in Idaho from September 1979 to June 1980. Tagging operations from 1976 to 1979 are summarized in the Appendix.

TECHNIQUES USED

During the spring of 1976, the states of Washington and Oregon provided personnel and equipment to tag fish at the McCall, Rapid River and Kooskia National Fish Hatcheries. By the fall of 1976, we had constructed our own mobile unit, which we presently use. Our tagging equipment utilizes the binary coding scheme.

A complete description of the mobile unit, the machines and the various procedures used in the tagging program is detailed in a coded wire tagging manual that was completed and published in 1980 (Duke, 1980).

All tagging operations summarized in this report follow the basic methodology for reporting coded wire tag data. The binary code designation lists the agency, then the DATA one row and the DATA two row. For example, I0/21/14 represents Agency Code 10, DATA Row 1 is 21 and DATA Row 2 is 14.

Individual tagged lots of fish are cataloged by year of outmigration, species and hatcheries. Individual DATA information is summarized under each station.

Tag loss figures were derived by taking a tag retention check and multiplying that percentage by the total fish released. In some situations where a tag retention check could not be made, a 3.0% tag loss was assumed. This is the approximate average over 4 years of tagging.

RESULTS

1980 Outmigration

The tagging season started in September, 1979 and was completed in June, 1980. During the year tagging was conducted at six Idaho hatcheries. Special tagging operations were conducted at three locations - Rapid River Hatchery (Idaho Power Company), Dworshak National Fish Hatchery and Hagerman National Fish Hatchery.

A total of 930,544 fish were tagged for release during the fall of 1979 and the spring of 1980. Included in this total were 375,325 spring chinook salmon, 119,426 fall chinook salmon and 435,793 summer steelhead.

Electronic problems which plagued the 1978-79 tagging operations were resolved before the start of the fall marking season. Consequently, machine problems throughout the year were few in number and of minor consequence. The mobile unit itself continues to perform well although some minor repair and modification will be necessary before the start of the 1980-81 tagging schedule.

Problems of fish disease and tagging mortality were minimal in all groups. The absence of these problems reflects the excellent health of the fish at the hatcheries during tagging operations.

Juvenile outmigration for the spring of 1980 appears to be the best in recent years. Although snow pack throughout much of the state was below normal, heavy spring rainfall provided adequate flows for juvenile migration.

National Marine Fisheries Service (NMFS) personnel located at the various Snake River hydroelectric projects reported above average juvenile survival for all groups of fish, especially those from Dworshak National Fish Hatchery. In addition, a large transport operation was conducted with more than 5 million chinook and steel-head transported from Little Goose and Lower Granite Dams by truck and barge.

Spring Chinook

Hayden Creek Fish Hatchery

Experimental Groups: 2

Purpose: Hatchery contribution - homing

Binary codes: 10/21/25 - Control
10/21/26 - Morpholine treated

Work dates: 1-4 April 1980

	10/21/25	10/21/26
Total tagged fish:	41,600	41,560
Tagged fish mortality:	468(1.1%)	244(.6%)
Tag loss:	1,032(2.5%)	166(.4%)
Tagged fish released:	40,100	41,150

Total hatchery release: 424,424

During the past year, fish production was limited to spring chinook salmon. Consequently, this release represents the largest spring release of salmon from the facility. The marking operation was conducted to evaluate this large release and also evaluate the effectiveness of the fish attractant "Morpholine".

Fish from the south pond were identified with the data code 10/21/25 and represented the control. Fish from the north pond were identified with data code 10/21/26. These fish were administered Morpholine by a drip treatment from 3-16 March 1980. Both groups were released from the pond and caught in a trap at the outlet. They were then trucked to the raceways for tagging. Initial mortality varied because of the excessive handling, but was high for some truck loads. Fish were allowed to recover in the raceways overnight if possible before further handling and marking. Consequently, the actual tagging mortality was low. Since the fish were released directly into Hayden Creek, the delayed mortality is not known, but there was no indication of excessive mortality during the week following release. A total of 195,440 fish were released from the south pond and 228,984 from the north pond. Average size at release was 58.2/kg (26.4/lb).

A tag retention check was taken on both groups 24 April 1980. A total of 750 fish were decked in group 10/21/26 and three were not tagged, for a tag loss of .4%. A check of 523 from group 10/21/25 showed 13 without tags for a tag loss of 2.48%.

Kooskia National Fish Hatchery

Experimental groups: 2

Purpose: Hatchery Contribution - Migration - Homing

Binary codes: 5/5/29 - Transport 5/5/32 - Control

Work dates: 10-15 March 1980

Total tagged fish:	5/5/29 62,531	5/5/32 61,418
Tagged fish mortality:	231 (.6%)	118 (.2%)
Tag loss:	0(0)	0(0)
Tagged fish released:	62,300	61,300

Total hatchery release: 766,946

Two groups were identified to evaluate contribution and homing behavior. The latter study was done in cooperation with the University of Idaho Cooperative Fishery Unit. Both groups were progeny from eggs taken at Kooskia National Fish Hatchery. Fish were uniform in size and no sorting to size was done in the tagging unit. Fish when released were 51.0/kg (23.4/lb) and 131 mm (5.2 in) in length.

Group 5/5/32 represented the control and contribution study group. These fish were held in raceways and then released directly to Clear Creek on 16 April 1980. Mortality on this group was negligible.

Group 5/5/29 was used to evaluate homing behavior. This is a replicate of 6

last year's experiment. Fish were released from ponds and were allowed to migrate to the adult holding facility. There they were captured and trucked to Lower Granite Dam. At Lower Granite Dam about 26,000 were transported by truck and 36,000 by barge to below Bonneville Dam. Releases were made from 23 April 1980 to 5 May 1980.

On 27 April 1980 a tag retention check taken on 150 fish at Kooskia National Fish Hatchery, 100 at Lower Granite Dam, and 50 which were sacrificed for an ATPase study showed no tag loss in 300 snouts.

The total hatchery release of 766,945 reflects releases of two stocks of fish. A release of 527,500 Carson stock progeny were released into Clear Creek on 14 April 1980; 239,446 progeny of Kooskia stock on the same date were released including groups 5/5/29 and 5/5/32.

Rapid River Fish Hatchery

Experimental group: 3

Purpose: Hatchery contribution - Transportation

Binary Codes: 10/21/13 - Control
10/21/14 - Control
10/21/15 - Transport

Work dates: 5-9 November 1979 and 8-14 April 1980

	10/21/13	10/21/14	10/21/15
Total tagged fish:	41,618	41,216	40,193
Tagged fish mortality:	378(.9%)	96(.2%)	987(2.5%)
Tag loss:	2,040(4.9%)	2,020(4.9%)	1,206(3.0%)
Tagged fish released:	39,200	39,100	38,000

Total hatchery release: 2,811,593

Three expermental groups were tagged at Rapid River. Two groups (data codes 10/21/13 and 10/21/14) were tagged in the fall for contribution evaluation and also as a control in a homing behavior study conducted by the University of Idaho, Cooperative Fishery Unit. Both tag groups were combined to make one study group. In addition, all the fish in group 10/21/13 and 23,147 in group 10/21/14 (64,765 total) were freeze branded with an "IU" on the left anterior in an upright position (L.A. "IU" pos. 1). These fish were released into a drain ditch as they were tagged. Although most stayed until spring, some fall migration was evident and some fish were collected at Lower Granite Dam in the late fall.

The third group, data code 10/21/15, was tagged at the adult trapping facility 2.4 km (1.5 mi) below the hatchery. A portion of the fish migrating from the hatchery was diverted into the adult trap. Those fish previously tagged were sorted and re-leased back to the river. The unmarked fish were tagged and received a left anterior "IU" freezebrand in an upside down position (LA "IU" pos. 3). These fish were held
for a short duration and trucked to Lower Granite Dam for transport to below Bonneville.

A mix-up during transportation from Lower Granite Dam resulted in the release of one tanker load of chinook and steelhead into Blaylock ponds near The Dalles on 14 April 1980. Approximately 13,000 fish from this group were on the truck. It is not known what the effect will be on the homing behavior. A total of 25,000 were treated according to experimental design.

Fish released from all three groups were 44.5/kg (22/lb) in size at time of migration. About 10% were diagnosed as having sunburn on their backs at migration. A tag retention check of 107 fish taken on 22 April 1980 indicated 4.9% loss.

A total hatchery release figure includes an estimated 206,770 fish which left in the fall, and 2,604,823 fish released in the spring.

Red River Rearing Pond

Experimental group: 1

Purpose: Hatchery Contribution - Pond Rearing- Rearing Time

Binary codes: 10/21/12

Work dates: 25-27 September 1979

Total tagged fish: 45,189

Tagged fish mortality: 34 (<.1%)

Tag loss: 1,355 (3.0% assumed)

Tagged fish released: 43,800

Total hatchery release: 228,000

The tagging operation at Red River was conducted to evaluate pond rearing and the contribution of these fish to various fisheries. Because of the low population density in the pond, obtaining a large sample for tagging was difficult. Fish were collected using an umbrella type net and then held in a live box for tagging. An attempt to seine the fish was unsuccessful. All fish were released after tagging into Red River, a tributary to the South Fork of the Clearwater. Fish were released at 59.5/kg (27/lb) and in excellent condition with no signs of disease or deformities of the type seen in earlier years. Because of the direct release and inadequate holding facilities, no tag retention check was taken. However, it is expected to be low because of uniform fish size and absence of tagging problems.

Fall Chinook

Hagerman National Fish Hatchery

Experimental groups: 2

Purpose: Hatchery Contribution - Transportation

Binary Codes: 5/5/27 - Control
5/5/28 - Transport

Work dates: 28 May-3 June 1980

	5/5/27	5/5/28
Total fish tagged:	60,983	58,443
Tagged fish mortality:	261(.4%)	339(.6%)
Tag loss:	2,622(4.3%)	2,104(3.6%)
Tagged fish released:	58,100	56,000

Total hatchery release: 236,235

Two groups of fish were tagged to evaluate the contribution of these fish in the ocean fisheries. One group was used to evaluate the effectiveness of transporting these fish around Snake and Columbia River dams.

Group 5/5/27 was used as a control. These fish were transported 3 June 1980 and released into the Snake River near Asotin, Washington. Group 5/5/28 was trans-ported to Lower Granite Dam and placed in the raceways. They were then allowed to migrate voluntarily from the raceway into a waiting truck. Fish were then trans-ported to below Bonneville Dam. Releases were made periodically from 6 to 23 June 1980.

The tagged fish were selected from fish spawned later in the season. Fish from earlier egg takes were released prior to the tagging operations as unmarked fish. They were also transported to the Snake River and released near Asotin, Washington. On 22 May 1980, 47,550 fish at 83.8/kg (38.0/lb) were released and on 27 May 1980 an additional 69,850 fish were released at a size of 97.7/kg (44.3/lb). The tagged fish were somewhat smaller and averaged 127.6/kg (57.9/lb) and 130.5/kg (59.2/lb) for groups 5/5/27 and 5/5/28, respectively.

The fish selected for tagging were not uniform in size. No sorting was done but mortality was higher for those fish less than 70 mm (2.8 in) in length. The fish in both groups were difficult to handle. In comparison to most chinook, these appeared to be extremely wild, excitable, and easily stressed. Hatchery personnel had to feed them from two raceways away in order for them to take the feed readily. Towards the end of the operation a few cases of sore back was prevalent, presumably brought on from the stress of handling and crowding. All fish were progeny of wild parents captured at the dams. On 2 June 1980 a sample of 600 fish from group 5/5/27 were checked for tag retention and 26 did not have a tag in their snout. A similar check of group 5/5/28 taken at Lower Granite Dam 6 June 1980 showed 9 fish without a tag in a sample of 251 fish.

Summer Steelhead

Dworshak National Fish Hatchery

Experimental groups: 4

Purpose: Hatchery Contribution - Homing - Age at Release

Binary codes: 5/4/55 - System II
10/21/19 - System III
10/21/61 - Homing Migration
10/21/62 - System I 2-yr old

Work dates: 5/4/55, 10/21/61, 10/21/62: 3-14 December 1980
10/21/19: 28-30 April 1980

	5/4/55	10/21/61	10/21/62	10/21/19
Total tagged fish:	62,845	51,244	48,927	41,495
Tagged fish mortality:	1,840(2.9%)	507(1.0%)	534(1.1%)	250(.6%)
Tag loss:	1,830(3.0%)	1,537(3.0%)	1,468(3.0%)	1,245(3.0%)
Tagged fish released:	59,175	49,200	46,925	40,000

Total hatchery release: 2,696,601

In order to effectively evaluate the contribution of fish from Dworshak National Fish Hatchery, three tag groups were used to identify fish from each of the three water systems at the hatchery. An additional tag group was applied in late spring to voluntary migrants leaving Water System II. This migration study was conducted in cooperation with the University of Idaho Cooperative Fishery Unit and represents a replicate of the 1979 experiment.

Data code 10/21/62 was used to identify 2-year-old (1978 brood year) smolts reared in System I. Tagged fish were held in ponds until their release on 17 April 1980. At release they were 14.3/kg (6.5/lb) in size. These smolts, as well as the other two contribution study groups, were pumped to the North Fork of the Clearwater River.

Water System II (1-year-old fish) was represented by data code 5/4/55. After tagging, they were held in ponds. Despite the capability of releasing these fish directly into the Clearwater, these fish were pumped to the North Fork Clearwater River in the same manner as the other two contribution study groups. This was done to eliminate any bias which might have resulted from a differential handling - release procedure. Smolts released 17 April 1980 were 16.8/kg (7.6/lb). General fish health in System II was good and perhaps the best in recent years but somewhat poorer than that of System I and III. This was observed at tagging and is reflected in the higher observed mortality prior to release.

Smolts reared in System III (I-year-old fish) were identified with data code 10/21/61. They were slightly smaller at 19.2/kg (8.7/lb) when released than fish in System II. Fish were held in ponds until their release 25 April 1980.

Smolts migrating voluntarily from System II were identified with data code 10/21/19. These smolts were allowed to migrate from the ponds into the bypass. They were than collected, and bucketed to the tagging unit. The smolts that migrated were 13. 4/kg (6.I/lb) and averaged 199 mm (7.8 in) in length. A freeze-branding operation was started, but was discontinued after 8,800 were branded with a left dorsal "4" in an upright position (LD 4 pos. 1). After marking, they were held until they could be trucked to the dams for transportation to below Bonneville Dam. Because of the timing and nature of the experiment, not all fish received the same type of transportation at the dams. Fish from this group were barged from both Lower Granite and Little Goose Dams and about 6,100 fish (454 kg, I,000 lb) went by truck. Fish were delivered to the barge or truck from 29 April to 2 May 1980. Two loads of 12,200 fish (2,000 lb) were hauled with chinook from Kooskia and in Clear Creek water.

Smolts from group 10/21/61 were checked for tag loss 24 April 1980. On a sample of 400, I2 were without tags. Tag retention checks were not conducted on the other tag codes.

The total hatchery release was comprised of four lots of fish. A total of 431,172 fish were released 16 April to I May 1980 from System I as 2-year-olds. There was also 93,210 one-year-old fish released from System I; however, these fish were moved to System I late in the rearing cycle to prevent overcrowding. They were released from I to 30 April 1980. The System II release totaled 1,009,329. These fish were released 17 April to 5 May 1980. Of these, an estimated 128,984 left voluntarily as part of the voluntary migrant study.

The System III release totaled 1,162,890 and were released from 22 April to 14 May 1980.

Hagerman National Fish Hatchery

Experimental groups: 3

Purpose: Hatchery Contribution - Cold Conditioning - Release Size

Binary codes: 5/6/35 - Control
5/6/36 - Cold conditioning (small)
5/6/37 - Cold conditioning (medium)

Work dates: 21-26 October 1980

	5/6/35	5/6/36	5/6/37
Total tagged fish:	42,077	42,263	41,890
Tagged fish mortality:	3,162(7.5%)	692(1.6%)	5,515(13.2%)
Tag loss:	2,140(5.5%)	1,745(4.2%)	2,075(5.7%)
Tagged fish released:	36,775	39,825	34,300

Total hatchery release: 168,000

The tagging operation at Hagerman National Fish Hatchery was under the direction of the University of Idaho Cooperative Fishery Unit. These tag groups were used in conjunction with several freeze brand groups. A complete listing of freeze brands and study groups are available from the Unit.

Group 5/6/35 were held at Hagerman National Fish Hatchery until their transport to Pahsimeroi Rearing ponds 21-23 April 1980. This group was used as a control (unconditioned) in a cold water conditioning experiment. Fish were released from the ponds 27 April 1980. This group was used as a control (unconditioned) in a cold water conditioning experiment. Fish were released from the ponds 27 April 1980. A total of 10,464 fish from this group were freezebranded with a left anterior "$\overline{\overline{+}}$" turned 90° to the right (L.A.$\overline{\overline{+}}$ pos. 2). Fish when released were 11.9/kg (5.4/lb) in size and for study purposes called "small." About 5% of the branded fish were observed with open sores at time of migration.

A tag retention check taken 26 April 1980 showed 4 without tags in a total sample of 73 fish.

Group 5/6/36 was held at Hagerman National Fish Hatchery until their release in the Pahsimeroi ponds 4 and 6 February 1980. This group was "cold conditioned" (reared in natural Pahsimeroi River water) until their release from the ponds into the Pahsimeroi River on 27 April 1980. This group was 11.5/kg (5.2/lb) and 209.7 mm (8.3 in) in length. For purposes of the study, these were considered "small cold conditioned fish." A total of 10,519 of these were freezebranded with a left dorsal ⍒ rotated 90° to the left (L.D.⍒ pos. 4). A tag retention check 26 April 1980 showed 3 untagged fish in a sample of 72. Personnel also observed 3% precotial fish in the sample.

Group 5/6/37 was held at Hagerman National Fish Hatchery until they were released into the Pahsimeroi ponds on 2, 6 and 8 February 1980. This group was "cold conditioned" until their release 27 April 1980. These fish averaged 8.2/kg (3.7/lb) and 226.8 mm (8.9 in) in length. These were considered "medium, cold conditioned fish" for experimental purposes. These fish were also freezebranded. A total of 10,077 were branded with a right dorsal turned 90° to the left (R.D.⍒ pos. 4). A tag retention check taken 26 April 1980 showed two untagged in a sample of 61 fish. Observations at that time also showed 5.7% of the fish to be precotial. The health condition of these fish was less than the other groups and is indicated in the 13.2% mortality.

The total hatchery release figure of 168,000 is the number transported from Hagerman National Fish Hatchery to the Pahsimeroi River. It does not take into account the mortality on the various fish groups while they were held in the Pahsimeroi ponds. Steelhead smolts were also released into the South Fork of the Salmon River as unmarked fish. All fish were Dworshak stock.

Niagara Springs Fish Hatchery

Experimental groups: 2

Purpose: Hatchery Contribution - Diet Feed Trial

Binary codes: 10/21/56 - OMP 30 day
10/21/57 - Dry-Control

Work dates: 9-12 October 1979

	10/21/56	10/21/57
Total tagged fish:	52,576	52,476
Tagged fish mortality:	1,099(2.1%)	576(1.1%)
Tag loss:	1,577(3.0%)	1,575(3.0%)
Tagged fish released:	49,900	50,325

Total hatchery release: 1,697,060

Two groups of smolts were identified to evaluate contribution and replicate a diet feed trial experiment. Group 10/21/56 was fed normal dry diet until 30 days prior to release. They were then switched to an Oregon Moist (OMP) diet. This group when released into the Pahsimeroi River 6-16 April 1980 averaged 14.3/kg (6.5/lb). Fish health at time of release was good. Most mortality occurred immediately after tagging. Fish were 77.2/kg (35/lb) when tagged.

Smolts used as a control and fed the regular dry diet were identified with data code 10/21/57. These fish were also 14.3/kg (6.5/lb) when released in the Pahsimeroi River 7-17 May 1980. Fish health remained excellent throughout the year with no disease problems similar to those experienced in previous years.

A tag retention check on either group could not be made so the average 3% tag loss was assumed. The total hatchery release is for the Pahsimeroi River only. Additional smolt releases were made into Hells Canyon. These included a release of 548,987 fish on 10 October 1979 and 348,220 released 11 February 1980 (none tagged).

APPENDIX

List of binary codes used by Idaho Department of Fish and Game at Idaho hatcheries for 1976-1980 releases.

Year	Code	Hatchery	Species	Purpose
1976	10/1/1	McCall	su. ck.	Contribution
	10/1/2	Rapid River	sp. ck.	"
	10/1/3	Kooskia	sp. ck.	"
1977	10/2/5	McCall	su. ck.	Contribution - summer chinook
	10/2/6	Rapid River	sp. ck.	Contribution - time of marking (Fall)
	10/2/7	Rapid River	sp. ck.	Contribution - time of marking (Spring)
	10/2/14	Pahsimeroi	su. ck.	Contribution - summer chinook
	10/2/16	Hayden Creek	sp. ck.	Time of release & contribution
	10/2/17	Kooskia	sp. ck.	Age at release
	10/2/18	Kooskia	sp. ck.	Age at release
	10/2/32	Hayden Creek	sh.	Stock contribution
	10/2/33	Hayden Creek	sh.	Stock contribution
	10/2/34	Niagara Springs	sh.	Diet feed trials & contribution
	10/2/35	Niagara Springs	sh.	Diet feet trials & contribution
	10/2/36	Niagara Springs	sh.	Diet feed trials & contribution
	10/13/7	Dworshak	sh.	Transport (truck)
	10/13/9	Dworshak	sh.	Transport (barge)
	10/13/10	Dworshak	sh.	Hatchery rearing - Age at release (II)
	10/13/11	Dworshak	sh.	Hatchery rearing - Age at release (I)
	10/13/12	Dworshak	sh.	Hatchery rearing - release site
	10/13/13	Dworshak	sh.	Hatchery rearing control
1978	10/2/14	Rapid River	sp. ck.	Contribution
	10/2/31	Dworshak	sh.	Control & contribution
	10/3/21	Hayden Creek	sp. ck.	Time of release (fall) & contribution
	10/3/22	Hayden Creek	sp. ck.	Time of release (spring) & contribution
	10/3/23	McCall	su. ck.	Contribution - summer chinook
	10/3/27	Pahsimeroi	su. ck.	Contribution - summer chinook
	10/3/29	Kooskia	sp. ck.	Age at release - (Age 0)
	10/3/30	Kooskia	sp. ck.	Age at release - (Age I)
	10/3/45	Niagara Springs	sh.	Homing - eggs to Niagara
	10/3/46	Niagara Springs	sh.	Homing - fry to Niagara
	10/3/47	Niagara Springs	sh.	Homing - Niagara reared & contribution
	10/3/49	Dworshak	sh.	Homing - Pahsimeroi River release
	10/13/15	Kooskia	sp. ck.	Release area - Lochsa River
	10/13/15	Kooskia	sp. ck.	Satellite plant - Dworshak reared
1979	5/4/20	Hagerman	su. ck.	Homing-Migration-Transportation
	5/4/21	Hagerman	su. ck.	Homing-Migration
	5/4/25	Dworshak	sh.	Age at release
	5/4/26	Kooskia	sp. ck.	Age at release
	5/4/27	Kooskia	sp. ck.	Age at release - transportation
	5/4/54	Hayden Creek	sp. ck.	Contribution
	10/3/25	McCall	su. ck.	Hatchery evaluation, contribution
	10/3/43	Niagara Springs	sh.	Transportation - Early release
	10/3/44	Niagara Springs	sh.	Transportation - Late release
	10/3/48	Mackay	sp. ck.	Release location
	10/4/15	Rapid River	sp. ck.	Hatchery contribution
	10/4/24	Rapid River	sp. ck.	Hatchery contribution
	10/5/33	Dworshak	sh.	Cold conditioning-Homing-Migration
	10/5/34	Dworshak	sh.	Homing-migration-Age at release
	10/21/12	Red River	sp. ck.	Hatchery contribution-transportation

Year	Code	Hatchery	Species	Purpose
1980	5/4/55	Dworshak	sh.	Homing evaluation-Age at release
	5/5/27	Hagerman	f. ck.	Release location-control
	5/5/28	Hagerman	f. ck.	Release location-Transportation
	5/5/29	Kooskia	sp. ck.	Homing migration-Transportation
	5/5/32	Kooskia	sp. ck.	Homing migration-Control-contribution
	5/6/35	Hagerman	sh.	Cold conditioning-size at release
	5/6/36	Hagerman	sh.	Cold conditioning-size at release
	5/6/37	Hagerman	sh.	Cold conditioning-size at release
	10/21/13	Rapid River	sp. ck.	Homing-migration-control
	10/21/14	Rapid River	sp. ck.	Homing-migration-control
	10/21/15	Rapid River	sp. ck.	Homing-migration-Transportation
	10/21/19	Dworshak	sh.	Transportation-Homing-migration
	10/21/25	Hayden Creek	sp. ck.	Contribution
	10/21/26	Hayden Creek	sp. ck.	Contribution & morpholine
	10/21/56	Niagara Springs	sh.	Diet feed trials-Omp 30
	10/21/57	Niagara Springs	sh.	Diet feed trials-control, contribution
	10/21/61	Dworshak	sh.	Hatchery evaluation-Age at release
	10/21/62	Dworshak	sh.	Hatchery evaluation-Age at release

su. ck. = summer chinook
sp. ck. = spring chinook
f. ck. = fall chinook
sh. = steelhead

COLUMBIA BASIN SALMON & STEELHEAD

IDENTIFICATION & MODELING

(Recovery Operations)

ABSTRACT

The 1979 run of anadromous fish into Idaho marked the first year that a complete brood year of tagged fish could be evaluated. Preliminary analysis was possible for spring chinook at Rapid River and Kooskia, summer chinook at McCall and steelhead at Niagara Springs/Pahsimeroi.

I estimated that 56.4% of the adult spring chinook returning to Kooskia from the 1976 release reached the hatchery, 16.3% were taken in the Idaho sport fishery and 27.3% were taken in various Columbia River fisheries. No estimate was possible for the harvest in the ocean or in Idaho's Indian fishery.

The spring chinook returning from the 1976 Rapid River release were represented by 54.7% returns to the hatchery, 8.0% in the Idaho sport catch and 37.3% in Columbia River fisheries. Ocean harvest and Idaho's Indian harvest could not be estimated.

I estimated that 21.2% of the steelhead returning to the Pahsimeroi River returned to the hatchery, 19.5% were taken in the Idaho sport fishery and 59.3% were taken in fisheries in the Columbia River.

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INTRODUCTION

The 1979 run of anadromous fish into Idaho marked the first year that a complete brood year of tagged fish could be completely evaluated. The important age classes (1-ocean, 2-ocean, 3-ocean) had returned in this year for spring chinook salmon, DATA CODE 10/I/2 (Rapid River) and DATA CODE 10/1/3 (Kooskia) and for summer chinook salmon, DATA CODE 10/1/I (McCall). Major components for steelhead (1-ocean, 2-ocean) had also returned for DATA CODES 10/2/34, 10/2/35 and 10/2/36 (Niagara Springs/Pahsimeroi). The evaluation of these groups is still somewhat preliminary since a few salmon return as 4-ocean fish and a few steelhead as 3-ocean fish. In addition there will be a number of tags that have not yet cleared the systems of downriver agencies and down-river sampling rates are still preliminary estimates.

All other DATA CODES have one or more components that have not yet returned from the ocean.

TECHNIQUES USED

Data Collection

At the time of tagging, all tagged fish were adipose clipped. This clip is retained throughout the fish's life cycle and identifies the adult as a coded wire tagged fish. When a clipped adult is recovered, the snout is removed and the tag extracted.

Snouts are recovered in various fisheries, at hatcheries and on spawning ground surveys. Fisheries recoveries are from ocean, river gill net, sport and Indian fisheries. These fisheries are sampled periodically for adipose clipped fish at various sampling stations. The coastal states also conduct extensive campaigns for the encouragement of voluntary returns from the various sport fisheries. The only pertinent data that accompanies these voluntary returns are catch location and some-times length.

Snouts are also collected at hatcheries during spawning operations. Each fish that enters the hatchery is examined for an adipose clip. When the fish is spawned, the snout is removed, bagged and data included on sex, length, date taken, and any abnormalities observed.

Spawning ground surveys were conducted in the Salmon River drainage. Department personnel examined kelts for an adipose clip. The South Fork of the Salmon River was re-surveyed every 2-4 days from 18 August to 9 September 1979. This intensified effort was made to recover tags from fish tagged at McCall Hatchery and released in the South Fork Salmon River. Data collected were the same for these fish as those recovered at the hatchery with the addition of whether or not the fish had completed spawning.

Tags were extracted from the snouts at our tag recovery laboratory. Two methods of extraction were used: 1) if the detector showed a tag present, then the tag was dissected from the nose using the process of elimination; 2) if the tag was not detectable, the head was remagnetized and if still a tag was not detected, the head was dissolved completely in a 50% solution of continuously agitated potassium hydroxide (KOH).

Upon extraction, the binary code was read and the data recorded. During this past *year a* computer program was developed to store all tagging operation and tag

recovery data. This program lists each individual tag grouped by data code and contains information on the fish group, the recovery location of the tag, date of recovery, recovering agency and an identification number for reference to the original tag data. It also refers to each tagging operation by data code, and gives complete information on the fish tagged, release location, release date, purpose of the study, number tagged, mortality, tag loss, tags released and the total group release.

Data Analysis

The analysis of tag returns is preliminary at this time. Even those tag groups that have had all major components returned are incomplete. A few fish may return as older fish and some tags will be returned as they belatedly clear the recovery agency's system.

Tag recoveries in downriver fisheries can be utilized to estimate the total number of tagged fish caught in that fishery and the total contribution of Idaho fish or an individual hatchery's fish to that fishery.

The known sampling rate for that fishery in a given year can be utilized to estimate the total number of tagged fish actually caught in that fishery. For example, the Lower Columbia River sport fishery was sampled at a 10% rate in 1979 (Table I). Each tag recovery represents 10% of the actual tagged fish that were caught in that fishery (5 tags x 10 = 50 estimated tagged fish caught).

We calculated the total fish caught in a given fishery that were released from a given hatchery by applying the ratio of marked and unmarked fish released at that station. For example, if 5% of the fish were marked for contribution purposes to represent the standard hatchery product then each of the estimated tagged fish represents 20 unmarked fish and the estimated tagged fish caught in the fishery is multiplied by this figure to calculate an estimated contribution of that group of fish to that specific fishery (50 estimated tagged fish x 20 = 1,000 fish contribution).

A basic assumption in using marked, unmarked ratios is that marked and unmarked fish return at the same rate. However we found that tagged and untagged fish were not returning to hatcheries in the same ratios that they were in at release. Generally, tagged fish were returning at a lower rate. We believe that this differential ratio is the result of excessive handling of tagged juveniles and adults at the Snake River dams and the sacrificing of significant numbers of tagged fish at the dams to determine survival and migration rates to the dams. Consequently we utilized the marked:unmarked ratios of the returning groups of fish at the hatchery for our calculations. We believe that this figure is more representative of the actual ratio of marked:unmarked fish in the river.

Each of our tagging experiments had a tag group that represented the general hatchery product. This group was used to calculate marked:unmarked ratios. In those cases where there were other tag groups that were testing some other aspect of the release and were not typical of the general hatchery release, we did not utilize these fish in calculating marked: unmarked ratios. Each group was calculated separately to estimate total tagged fish caught and contributions. The tagged group representing the general hatchery product was used as a control in comparing these groups. For example, if a hatchery released 500,000 fish which included three tagged groups of
50,000 each and only one of which represented the general hatchery release we would utilize the data as follows:

(1) General Hatchery Release:

500,000-100,000 atypical fish = 400,000
Marked:total release ratio - 50,000:400,000 or I:8 contributions would be calculated for the general hatchery product by multiplying the estimated catch of tagged fish by 8.

(2) Atypical Fish:

Each 50,000 group would represent a 50,000 marked sample of that type of fish only and so estimated tagged fish caught would essentially be multi-plied by I to arrive at the contribution to a given fishery from that group.

(3) Total Contributions:

The total contribution of that station's release to an individual fishery would be calculated by adding the totals from each of these three groups (general hatchery product and each of the atypical groups).

Table 1. Sampling rates used in determining Idaho's contribution to Columbia River Fisheries and back to the hatchery, 1977-1979.

Year	Lower Columbia River sport fishery[1/] (%)	Zone 1 - 5 gillnet fishery[2/] (%)	Zone 6 gillnet fishery[2/] (%)	Lower Columbia River ceremonial fishery[2/] (%)	Return to hatcheries (%)
1977	6.8	18.2	--	--	100
1978	5.6	33.0	38.6	--	100
1979	10.0	29.0	34.0	74.0	100

1/ Sampling rates for the Lower Columbia River sport fishery for 1977 were taken from Collins (1978), for 1978 from King (1979) and for 1979 from King (1980).

2/ Sampling rates for the Zone 1-5 Lower Columbia River gillnet fishery, the Zone 6 Lower Columbia River Indian gillnet fishery and the Lower Columbia River Indian ceremonial fishery were supplied by Basham of the National Marime Fisheries Service.

RESULTS

Tag Recoveries

Spring Chinook

Hayden Creek Fish Hatchery

DATA CODES: 10/2/16, 10/3/21, 10/3/22

Spring chinook tagged with data code 10/2/16 were released in April, 1977. No tags were recovered in 1-ocean and 2-ocean fish that returned in 1978 and 1979. Analysis will be complete with the return of 3-ocean fish in 1980.

Spring chinook data code 10/3/21 were released in the fall of 1977 and fish with data code I0/3/22 in the spring of 1978. No tags were recovered from data code 10/3/21 fish as I-ocean fish in I979. These fish (1-ocean) with data code 10/3/22 returned to the hatchery in 1979. Analysis of these two groups will be complete in 1981.

The age class composition of the spring chinook run returning to Hayden Creek in 1979 was 6 1-ocean fish, 24 2-ocean fish and 7 3-ocean fish.

Kooskia National Fish Hatchery

DATA CODES: 10/1/3, 10/2/17, 10/2/18, 10/3/29, 10/3/30, 10/13/14

Spring chinook containing data code 10/I/3 tags were released in 1976 to evaluate hatchery contributions to downriver and ocean fisheries. Preliminary evaluation was completed with the return of 3-ocean fish in 1979. The recovery of a small number of 4-ocean fish in 1980 may add to this total. A total of 137 tags were recovered from this group of fish (Table 2).

Table 2. Tag recoveries in 1977-1979 for data code 10/I/3 spring chinook that had been released from Kooskia National Fish Hatchery in I976.

Year	Columbia River sport fishery	Zone 1-5 gillnet fishery	Lower Columbia River ceremonial fishery	Returns to hatchery	Other[1/]	Total
1977	--	2	--	--	--	2
1978	2	--	--	96	--	98
1979	--	3	3	30	1	37
Total	2	5	3	126	1	137

1/ One tagged fish was recovered in the test fishing operation in the Lower Columbia River.

The total contribution of Kooskia National Fish Hatchery spring chinook salmon released in 1976 to the various fisheries and to the hatchery is listed in Table 3.

Table 3. Estimated contributions to specific fisheries and returns to the hatchery by spring chinook released in 1976 from Kooskia National Fish Hatchery.

Year	Columbia River[1/] sport fishery	Zone 1-5[1/] gillnet fishery	Columbia River[1/] ceremonial fishery	Idaho[2/] sport fishery	Returns[3/] to hatchery	Total
1977	--	153	--	42	214	409
1978	500	--	--	465	1,485	2,450
1979	--	139	56	--	51	246
Total	500	292	56	507	1,750	3,105[4/]
%	16.1	9.4	1.8	16.3	56.4	

1/ Estimated contributions to a given fishery were calculated by multiplying the actual tags recovered by the sampling rate factor and by the marked fish ratio.

2/ The contributions to the Idaho sport fishery were calculated by utilizing Ortmann's Clearwater River salmon harvest (Ortmann 1978, Ortmann 1979). We assumed that 75% of the harvested fish were hatchery origin and 25% wild origin.

3/ The returns to the hatchery were the actual counts as enumerated at the weir.

4/ This total does not include fish taken in the Idaho Indian fishery which occurred on this run in 1977, 1978 and 1979.

Spring chinook with data code 10/2/17 were released in the spring of 1977. No tags with this code were recovered in 1978 from fish returning after I year in the ocean and only one fish was recovered from a 2-ocean fish in 1979. This fish was caught in the troll fishery off Baranof Island, Alaska on 18 August 1979. Analysis on this group of fish will be complete after 3-ocean fish return in 1980.

Spring chinook with data code 10/2/18 were released in the spring of 1977. No tags have been recovered from 1-ocean or 2-ocean fish that returned in 1978 and 1979. Analysis of this group of fish will be complete after 3-ocean fish return in 1980.

Spring chinook with data codes 10/3/29, 10/3/30 and 10/13/14 were released in 1978. No tags were recovered from fish returning as 1-ocean fish. Analysis will not be complete for this group until 1981 when 2-ocean and 3-ocean fish have returned.

A total of 185 spring chinook returned to the hatchery in 1979. The age composition of the run was 2.2% 1-ocean fish, 70.4% 2-ocean fish and 27.4% 3-ocean fish.

Rapid River Hatchery

DATA CODES: 10/1/2, 10/2/6, 10/2/7, 10/2/14

Spring chinook represented by data code 10/1/2 were released in 1976 and completed their life cycle in 1979. These fish were used to evaluate hatchery contribution to the various downriver and ocean fisheries. Preliminary evaluation was completed with the return of 3-ocean fish in 1979. The recovery of a small number of 4-ocean fish in 1980 may add to this total. A total of 107 tags were recovered from this group of fish (Table 4).

Table 4. Tag recoveries for data code 10/1/2 spring chinook, 1977-1979.

Year	Columbia River sport fishery	Zone 1-5 gillnet fishery	Zone 6 gillnet fishery	Columbia River ceremonial fishery	Returns to hatchery	Total
1977	--	--	--	--	2	2
1978	2	--	--	--	41	43
1979	1	4	2	5	64	76
Total	3	4	2	5	107	121[1/]

1/ An additional tag was recovered in the ocean in Washington Area 5. Sampling intensity is not available at this time from which to estimate the total contribution to the ocean fishery.

The total contribution of Rapid River Hatchery spring chinook salmon released in 1976 to the various fisheries and to the hatchery is listed in Table 5.

Spring chinook with data codes 10/2/6 and 10/2/7 were released in 1977. No tags with data code 10/2/6 were recovered in 1978 as l-ocean fish. Five fish from this tagged group returned to the hatchery in 1979 as 2-ocean fish. No tags with data code 10/2/7 were recovered in 1978 as 1-ocean fish. Ten tagged fish (2-ocean) from this group were recoved at the hatchery and 2 in the Columbia River sport fishery below Bonneville Dam. Analysis of these two groups of fish will be complete with the return of 3-ocean fish in l980.

Spring chinook with data code 10/2/14 was tagged in November 1977 and released in the spring of 1978. In 1979 eight tags were recovered from 1-ocean fish returning to the hatchery. Analysis of this group will be complete after the return of 2-ocean fish in 1980 and 3-ocean fish in 1981.

The spring chinook run composition in 1979 included 10.4% 1-ocean fish, 17.8% 2-ocean fish and 71.8% 3-ocean fish.

Table 5. Estimated contributions to specific fisheries and returns to the hatchery by spring chinook released in 1976 from Rapid River Hatchery.

Year	Columbia River sport fishery	Zone 1-5 gillnet fishery	Zone 6 gillnet fishery	Columbia River ceremonial fishery	Idaho[1/] sport fishery	Returns[2/] to hatchery	Total
1977	--	--	--	--	76	437	1,319
1978	2,192	--	--	--	882	3,890	6,158
1979	609	852	365	426	--	2,193	4,445
Total	2,801	852	365	426	958	6,520	11,922[3/]
%	23.5	7.1	3.1	3.6	8.0	54.7	

1/ Ortmann's Little Salmon River harvest estimates adjusted to reflect harvest of appropriate age classes (Ortmann 1978, Ortmann 1979).

2/ The returns to the hatchery were the actual counts as enumerated at the weir.

3/ This total is a minimum estimate since two significant harvests (ocean and Idaho Indian fisheries) are not known.

Summer Chinook

McCall Fish Hatchery

DATA CODES: 10/1/1, 10/2/5, 10/3/23

Summer chinook tagged with data code 10/I/1 were released in 1976 to evaluate the program at the McCall Hatchery. No tags were recovered in 1977, 1978 or 1979 as fish came back as I-ocean, 2-ocean, and 3-ocean returns. Releases from this. hatchery returned to the South Fork Salmon River rather than the hatchery. Since there was no weir during these years, hatchery returns had to be evaluated on the spawning grounds. A better analysis will be possible for future tagging groups as a weir was constructed on the South Fork Salmon River in 1980 to allow for inspection and collection of chinook as they move into the river.

Summer chinook with data code 10/2/5 were released in 1977. No tags from this group were recovered in 1978 as 1-ocean fish or in 1979 as 2-ocean fish. Analysis will be complete for this group with the return of 3-ocean fish in 1980.

Summer chinook with data code 10/3/23 were released in 1978. One fish returning after 1 year in the ocean was intercepted at a hatchery weir on the Deschutes River in Oregon during August, 1979. Analysis of this group will be complete after 3-ocean fish return in 1981.

Pahsimeroi River Rearing Ponds

DATA CODES: 10/2/13, 10/3/27

Summer chinook containing tags with data code 10/2/13 were released in 1977. No tags from this group were recovered from l-ocean fish in 1978 or 2-ocean fish in 1979. Analysis will be complete with the return of 3-ocean fish in 1980.

Summer chinook with data code 10/3/27 were released in 1978. One tag from this group was recovered from a 1-ocean fish at the weir in 1979. Analysis of this group will be complete after 3-ocean fish return in 1981.

Age composition of 33 unmarked summer chinook counted at the Pahsimeroi weir in 1979 was 3% 1-ocean fish, 6.1% 2-ocean fish and 90.9% 3-ocean fish.

Summer Steelhead

Dworshak National Fish Hatchery (Group B Steelhead)

DATA CODES: 10/13/7, 10/13/9, 10/13/10, 10/13/11, 10/13/12, 10/13/13, 10/2/31, 10/3/49

Summer steelhead containing tags with data code 10/13/7 were released in 1977. One tagged l-ocean fish from this group was recovered in the Zone 6 gillnet fishery in 1978 and five tagged 2-ocean fish were recovered at the hatchery in 1980. Analysis will be for this group after the last fish return to the hatchery in the spring of 1981.

Summer steelhead with data code 10/13/9 were also released in 1977. One tagged 1-ocean fish from this group was recovered from the Zone 6 gillnet fishery in 1978. Sixteen 2-ocean tagged fish were recovered; 5 from the Zone 6 gillnet fishery in 1979 and 11 at the hatchery in 1980. Analysis will also be complete for this group in 1981.

Summer steelhead containing tags with data code 10/13/10 were released in 1977. Seventeen tagged fish from this group were recovered as 1-ocean fish (11 in the Zone 6 gillnet fishery in 1978 and 6 at the hatchery in 1979). One hundred nineteen tagged

2-ocean fish were recovered in 1979 (118 at the hatchery in 1979 and I in Oregon's test fishing effort in the Lower Columbia River in 1978). Analysis for this group will be complete in 1981 with the return of 3-ocean fish.

Summer steelhead with data code 10/13/11 were released in 1977. Four tagged fish from this group were recovered as 1-ocean fish in 1979 at the hatchery. A total of 45 tagged fish from this group returned as 2-ocean fish (5 to the Zone 6 gillnet fishery in 1979 and 40 to the hatchery in 1980). Analysis of this group will be complete in 1981.

A group of summer steelhead with data code 10/13/12 was also released in 1977. No tags from this group were recovered as 1-ocean fish. Four tagged fish from this group were recovered as 2-ocean fish (1 in the Zone 6 gillnet fishery in 1979 and 3 at the hatchery in 1980). Analysis of this group will be complete in 1981.

Summer steelhead tagged with data code 10/13/13 were another group of fish released in 1977. Three of these tags were recovered from 1-ocean fish at the hatchery in 1979 and 33 from 2-ocean fish (I in the Zone 6 gillnet fishery in 1979 and 32 at the hatchery in 1980). Analysis for this group will be complete after the 1981 returns.

These six marked groups of steelhead and the entire Dworshak production released in 1977 was subjected to poor migration flows because of a severe drought. These conditions are believed to have lowered survival of these fish and probably resulted in a lower number of tag recoveries and lower contributions to the various fisheries than would normally have been expected.

Summer steelhead were tagged with data code 10/2/31 and released in 1978. Twenty-six tagged fish were recovered after 1 year in the ocean (1 in the Zone 6 gillnet fishery in 1979 and 26 at the hatchery in the spring of 1980). Analysis will be complete after the returns to the hatchery in 1982.

A comparison group of steelhead to group 10/2/31 was marked with data code 10/3/49 and transported to the Pahsimeroi River for release in 1978. Twelve tagged fish from this group were recovered as 1-ocean fish; 1 in the Idaho sport fishery in Section 2 of the Salmon River, 9 at the Pahsimeroi weir in 1980 and 2 at Dworshak Hatchery in 1980. Analysis for this group will also be complete in 1982.

The 1979 adult steelhead return to Dworshak Hatchery was 4,940. The age composition was 5.6% 1-ocean fish, 84.8% 2-ocean fish and 9.6% 3-ocean fish (Pettit and Lindland 1979).

The 1980 steelhead return to Dworshak was 2,520. The age composition included 8.5% 1-ocean fish, 78.5% 2-ocean fish and 13.0% 3-ocean fish (Pettit 1980). An estimated 1,250 steelhead were caught by Nez Perce Indian anglers from this run in addition to those that returned to the hatchery (Pettit 1980).

Hayden Creek Hatchery (Group A Steelhead)

DATA CODES: 10/2/32, 10/2/33

Steelhead containing tags with data codes 10/2/32 and 10/2/33 were released in 1977. No tags from either of these groups returned as 1-ocean or 2-ocean fish. We expect very little return from these fish as 3-ocean individuals.

This group of fish was also impacted by an unfavorable flow regime in 1977. 29

Kooskia National Fish Hatchery (Group B Steelhead)

DATA CODES: 10/13/15

Tag group 10/13/15 was released in 1978. We have recovered 19 tags from 1-ocean fish of this group. One tag was recovered in the Zone 6 gillnet fishery in 1979, 2 at Dworshak Hatchery in 1980 and 16 at Kooskia Hatchery in 1980. Analysis of this group will be complete after the returns to the hatchery in 1982.

Niagara Springs Fish Hatchery (Group A Steelhead)

DATA CODES: 10/2/34, 10/2/35, 10/2/36, 10/3/45, 10/3/46, 10/3/47

Steelhead with data codes 10/2/34, 10/2/35 and 10/2/36 were released in the Pahsimeroi River in 1977. Data code 10/2/36 represented the general hatchery release (fed dry feed throughout their stay in the hatchery). Data codes 10/2/34 and 10/2/35 represented a diet test in which fish were fed Oregon Moist Pellets (OMP) for the last 30 days prior to release and 10/2/35 fish were fed OMP for their last 14 days in the hatchery. Data code 10/2/36 was used as a control or to represent the present feeding regime of dry feed throughout their fish's hatchery life. Data code 10/2/36 was also used to represent the general hatchery release in calculating contributions to the various fisheries.

A severe drought occurred in 1977 and drastically effected the survival of smolts in their downstream trip to the ocean. Consequently, we expected and actually received very low numbers of fish returning as adults. This caused our tag recoveries and contributions to the various fisheries to be atypically low. However the fish were all released at nearly the same time and losses within the various groups due to the draught should have been similar.

Preliminary evaluation was completed with the return of 2-ocean fish in 1979. A total of 36 tags were recovered from these groups of fish (Table 6).

The total contribution of this group of Pahsimeroi River steelhead to the various fisheries is listed in Table 7.

Steelhead (Group A) with data codes 10/3/45 and 10/3/46 were released in the Pahsimeroi River in 1978. Group B steelhead with data code 10/3/47 were also released in the Pahsimeroi River in 1978. Four steelhead with data code 10/3/47 returned to the hatchery in 1980 as I-ocean fish. No tagged fish representing data codes 10/3/45 and 10/3/46 were recovered as 1-ocean fish. Analysis of this experiment will be complete after fish return to the facility in 1982.

The 1979 return of steelhead to the Pahsimeroi River was 2,501. The age composition included 7% 1-ocean fish and 93% 2-ocean fish. The 1980 run of I,620 adults contained 94% 1-ocean fish and 6% 2-ocean fish.

Table 6. Tag recoveries in 1978-1980 for data codes 10/2/34, 10/2/35 and 10/2/36 summer steelhead that had been released in the Pahsimeroi River in 1977.

Year	Columbia River sport fishery	Zone 6 gillnet fishery	Returns to hatchery	Total
DATA CODE 10/2/34 (30-day OMP)				
1978	--	2	--	2
1979	--	1	9	10
1980	--	--	6	6
Subtotal	0	3	15	18
DATA CODE 10/2/35 (14-day OMP)				
1978	--	1	--	1
1979	--	--	5	5
1980	--	--	3	3
Subtotal	0	1	8	9
DATA CODE 10/2/36 (dry feed/standard hatchery diet)				
1978	1	--	--	1
1979	--	1	2	3
1980	--	--	5	5
Subtotal	1	1	7	9
Total	1	5	30	36

Table 7. Estimated contributions[1]—/ to specific fisheries and returns to the hatchery by summer steelhead released in 1977 in the Pahsimeroi River.

Year	Columbia River sport fishery	Zone 6 gillnet fishery	Idaho[2/] sport fishery	Returns[3/] to hatchery	Total
DATA CODE 10/2/34					
1978	--	5	--	--	5
1979	--	3	--	9	12
1980	--	--	--	6	6
Subtotal	0	8	0	15	23
DATA CODE 10/2/35					
1978	--	3	--	--	3
1979	--	--	--	5	5
1980	--	--	0	3	3
Subtotal	0	3	0	8	11
General Hatchery Release (includes DATA CODE 10/2/36)					
1978	641	--	--	--	641
1979	--	107	22	161	290
1980	--	--	227	88	315
Subtotal	641	107	249	249	1,246
Total	641	118	249	272	1,280
Percent	50.1	9.2	19.5	21.2	

1/ Contributions to various fisheries are calculated by multiplying the tagged fish by the sampling ratio factor. In the case of the general hatchery release the control group is utilized to arrive at a marked:unmarked ratio to estimate the contribution of unmarked fish to the various fisheries.

2/ The Idaho sport harvest was taken from actual harvest figures rather than expanded by marked:unmarked ratios.

3/ The returns to the hatchery were the actual returns as enumerated at the weir.

COLUMBIA BASIN SALMON & STEELHEAD

IDENTIFICATION & MODELING

(Modeling Operations)

ABSTRACT

We received and reviewed the initial computer run for the fishery model and made the appropriate comments to the program coordinator.

Data was procured, summarized and forwarded to the program coordinator as requested.

The content and status of the fishery model will be reported by the program coordinator in his report.

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